

REMARKS

The Office Action dated August 8, 2002 has been carefully considered. Independent claim 1 has been amended to incorporate the limitations of claim 5. Claims 2 to 5 have been canceled without prejudice. Claims 6 to 11 remain pending unamended and for the reasons set forth below, reconsideration of claim 1, as amended, and claims 6 to 11 and their allowance are respectfully requested.

Independent claim 1 and claims 3 to 5, which depend therefrom have been rejected under 35 U.S.C. § 102(b) as being anticipated by United States Patent No. 5,990,418 to Bivona *et al.* ("Bivona"). This rejection is respectfully traversed.

Claims 3 to 5 have been canceled without prejudice.

Independent claim 1 has been amended to incorporate the limitations of claim 5. As amended, claim 1 recites a metal cap that is "constructed from a material selected from one of copper, aluminum, or alloys thereof." This limitation is not anticipated by Bivona. Bivona discloses a lid 104 which "may be made of metal or metal alloy, such as Kovar®." (Bivona at Column 5, lines 62-63.) Kovar® is a metal alloy of iron, nickel, and cobalt. Thus, Bivona does not disclose a metal cap constructed from a material selected from one of copper, aluminum, or alloys thereof. Accordingly, independent claim 1, as amended, should be allowed over Bivona and its allowance is respectfully requested.

Claim 2, which also depends from claim 1, has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Bivona in view of United States Patent Application Publication No. 2002/0063326 A1 by Nakashima ("Nakashima"). This rejection is respectfully traversed.

Claim 2 has been canceled without prejudice. Accordingly, withdrawal of the rejection of this claim is respectfully requested.

Claims 6, 7 and 9 to 11 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Bivona in view of United States Patent No. 5,940,271 to Mertol ("Mertol"). This rejection is respectfully traversed.

The Examiner cites Bivona (Figs. 1-10 and specifically Fig. 6) as disclosing a BGA package comprising: "a substrate 100 having first and second sides; *a metal heat slug 104 attached to said first side of said substrate, said metal heat slug having a die attach pad portion (foot of 104 portion)*; an integrated circuit device 102; a metal cap 104 having a side wall portion and a top portion forming an internal cavity" The Examiner then cites Mertol (Figs. 1-8 and specifically Fig. 3B) as disclosing "*at least one wirebond pad window portion, and peripheral rim portions; an integrated circuit device 5 attached to said die attach pad portion of said metal bent [sic] slug, wherein said metal cap is attached to said metal heat slug along said peripheral rim portions . . .*" which is missing from the disclosure of Bivona.

These two references in combination do not suggest claims 6, 7, and 9 to 11 because they simply do not disclose the structures cited by the Examiner. Specifically, Bivona does not disclose a metal heat slug. The Examiner cites the structure 104 of Bivona as being both a metal cap and a metal heat slug. The metal heat slug as claimed in claims 6, 7, and 9 to 11 is a separate and distinct structure from the metal cap and has (1) a die attach pad portion, to which an IC chip is attached, (2) at least one wire bond pad window portion, and (3) peripheral rim portions, to which the metal cap is attached. The structure 104 of Bivona is a metal cap that encloses the IC chip 102. The IC chip 102 is directly attached to the substrate 100 and the metal cap 104 is attached to the periphery of the substrate 100. Bivona does not disclose a metal heat slug to which both the IC chip 102 and the metal cap 104 are attached as required by claims 6, 7, and 9 to 11.

The Examiner points out that the "*foot of 104 portion*" is a die attach pad portion. That statement, however, does not correspond to the configurations illustrated in Figs 1 to 10 of Bivona. The foot portion of the metal cap 104 of Bivona is attached to the substrate 100. The foot portion of the metal cap 104 is not a die attach pad portion to which the IC chip 102 is attached.

Furthermore, Figure 3B of Mertol does not disclose a metal heat slug having "*at least one wirebond pad window portion, and peripheral rim portions; an integrated circuit device 5 attached to said die attach pad portion of said metal bent [sic] slug, wherein said metal cap is attached to said metal heat slug along said peripheral rim portions*" as stated by the Examiner. Figure 3B of Mertol shows an IC chip attached directly to a substrate 2 and encapsulated with an epoxy encapsulant 6 which is retained within a dam ring 5. A

heat sink 8 sits on top of the epoxy encapsulant 6 and is mechanically held in place by a clip 10. Thus, Mertol does not disclose a metal heat slug as claimed by claim 6. Accordingly, Bivona and Mertol references, either singly or in combination, do not disclose a metal heat slug as recited in claims 6, 7, and 9 to 11. The rejection of these claims should be withdrawn and their allowance over the cited references is respectfully requested.

Claim 8, which depends from claim 6, has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Bivona in view of Mertol and further in view of Nakashima. Specifically, the Examiner stated that Bivona and Mertol in combination discloses the claimed invention except for a metal cap having at least one hole in its top portion and Nakashima discloses "a ball grid array comprising: an integrated circuit device 11 using a bondwire connection and metal cap 31a having at least one hole in its top portion for the purpose of providing epoxy encapsulant material in a targeted area within the device."

But, as discussed above, the parent claim, claim 6, is patentable over Bivona and Mertol because these two references, either singly or in combination, do not disclose a metal heat slug as recited in claim 6. And Nakashima does not correct this deficiency of Bivona and Mertol. Accordingly, the rejection of claim 8 should be withdrawn and its allowance over Bivona, Mertol and Nakashima references is respectfully requested.

After entry of this Amendment, the pending claims are claims 1, and 6 to 11.

For the above reasons, the rejection of claims 1, and 6 to 11 over the prior art should be withdrawn and these claims should be allowed. Reconsideration, entry of the above amendments, and allowance are respectfully requested.

A Request for Extension of Time for one month for this response is enclosed herewith. Please charge any additional fees due for submission of this response to Pennie & Edmonds LLP deposit account No. 16-1150.

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Enclosures

APPENDIX

Changes to the Claims

5 Claims 2 through 5 have been canceled without prejudice.

Claim 1 was amended as shown below. All additions are underlined.

10 1. (Amended) A ball-grid array package comprising:
 a substrate having first and second sides;
 an integrated circuit device attached to said first side of said substrate;
 a metal cap having a side wall portion and a top portion forming an internal
15 cavity, wherein said metal cap is attached to said first side of said substrate along a peripheral
 portion of said first side so that said integrated circuit device is within said internal cavity;
 and

 an epoxy encapsulant material filling a substantial portion of said internal
cavity, and said epoxy encapsulant material being in contact with both said integrated circuit
device and said top portion of said metal cap.

20 wherein said metal cap is constructed from a material selected from one of
copper, aluminum, or alloys thereof.